CLAIMS

1 A quadrature frequency generator, comprising:

multiplier having first multiplicand, a second multiplicand and an output equal the multiplication of the first multiplicand and the second multiplicand;

a in-phase ac signal applied to said multiplier as first multiplicant; and

a quadrature ac signal derived from said second multiplicand by setting said output to zero ac signal.

2. The quadrature frequency generator as described in claim 1, wherein said multiplier is an analog multiplier.

3. The quadrature frequency generator as described in claim 2, wherein said in-phase ac signal is an in-phase voltage, and said quadrature ac signal is quadrature voltage.

4. The quadrature frequency generator as described in claim 3, wherein said multiplier is a differential multiplier, having:

a differential pair fed from a current source, which is controlled by said in-phase voltage,

said output is derived from the differential output of the differential pair; and

said quadrature ac voltage is derived from the differential input of the differential pair.

5. The quadrature frequency generator as described in claim 4, wherein said differential input is single-ended.

6. The quadrature frequency generator as described in claim 4, wherein a capacitor is connected between said differential output to ac short-circuit said differential output.

7. The quadrature frequency generator as described in claim 4, wherein said differential output is short-circuited to a supply voltage at ac ground.

8. The quadrature frequency generator as described in claim 4, wherein the transconductance of said current source is equal to one half of the transconductance of one of the differential pair, so that the amplitude of the quadrature ac voltage is equalized to the in-phase voltage.

9. The quadrature frequency generator as described in claim 4, wherein said output is single-ended.

10. The quadrature frequency generator as described in claim 9, wherein a capacitor is connected between said single-ended output and ac ground.

11. The quadrature frequency generator as described in claim 10, wherein said single-ended output is connected to a biasing power supply.

12. The quadrature frequency generator as described in claim 3, where in said multiplier is a MOSFET conductance multiplier, wherein:

said in-phase ac signal is applied to the drain of a MOSFET,

the source is set to said zero ac output,

said MOSFET is gate biased to the linear region of the drain V-I characteristic, and

said quadrature ac voltage is derived from the gate of said MOSFET.

13. The quadrature frequency generator as described in claim 12, wherein said source is connected to ground.

14. The quadrature frequency generator as described in claim 13, wherein the dc voltage at the drain is set equal to the difference between the dc gate-to-source voltage and the threshold voltage.

15. A method of generating a quadrature frequency signal from an in-phase signal, comprising the steps of:

applying an in-phase signal as a multiplicand to a multiplier;

setting the output of said multiplier to zero; and

outputting a quadrature signal from a second multiplicand of said multiplier.

16. The method of generating a quadrature frequency signal as described in claim 15, wherein said multiplier is an analog multiplier.